

# Algebra 2 CC Q2T2 Key

$$\begin{array}{r} 2x+1 \\ 3x-5 \overline{) 6x^2-7x-5} \\ \underline{-(6x^2-10x)} \phantom{-5} \\ 3x-5 \\ \underline{-(3x-5)} \\ 0 \end{array}$$

$$\boxed{2x+1}$$

$$\begin{array}{r} 5x^2-7x+14 \\ x+2 \overline{) 5x^3+3x^2+0x+1} \\ \underline{-(5x^3+10x^2)} \phantom{+1} \\ -7x^2+0x \phantom{+1} \\ \underline{-(-7x^2-14x)} \phantom{+1} \\ 14x+1 \\ \underline{-(14x+28)} \\ -27 \end{array}$$

$$\boxed{5x^2-7x+14 + \frac{-27}{x+2}}$$

$$\begin{array}{r} 7x-2 \\ x-3 \overline{) 7x^2-23x+6} \\ \underline{-(7x^2-21x)} \phantom{+6} \\ -2x+6 \\ \underline{-(-2x+6)} \\ 0 \end{array}$$

$$\boxed{7x-2}$$

$$\begin{array}{r} x^3-3x^2+9x-32 \\ x+3 \overline{) x^4+0x^3+0x^2-5x+10} \\ \underline{-(x^4+3x^3)} \phantom{+10} \\ -3x^3+0x^2-5x+10 \\ \underline{-(-3x^3-9x^2)} \phantom{+10} \\ 9x^2-5x+10 \\ \underline{-(9x^2+27x)} \phantom{+10} \\ -32x+10 \\ \underline{-(-32x-96)} \\ 106 \end{array}$$

$$\boxed{x^3-3x^2+9x-32 + \frac{106}{x+3}}$$



$$\begin{array}{r}
 2) \quad x-2 \overline{) \begin{array}{l} x^2 - x - 12 \\ x^3 - 3x^2 - 10x + 24 \\ -(x^3 - 2x^2) \\ \hline -x^2 - 10x \\ -(-x^2 + 2x) \\ \hline -12x + 24 \\ -(-12x + 24) \\ \hline 0 \end{array}} \\
 \end{array}$$

$$\begin{array}{c}
 x^2 - x - 12 \\
 \boxed{(x-4)(x+3)}
 \end{array}$$

↑  
Other factors

No remainder  
therefore  $(x-2)$  is  
a factor

$$\begin{array}{l}
 3) \quad x-1=0 \\
 \quad \quad x=1
 \end{array}
 \quad
 \begin{array}{l}
 3(1)^{107} + 14(1)^{35} - 16(1) \\
 3 + 14 - 16 = \boxed{1}
 \end{array}$$

$$\begin{array}{l}
 4) \quad x+2=0 \\
 \quad \quad x=-2
 \end{array}
 \quad
 \begin{array}{l}
 14(-2)^{10} - 2(-2)^3 - 17 \\
 14336 + 16 - 17 = \boxed{14335}
 \end{array}$$

$$\begin{array}{l}
 5) \quad x+3=0 \\
 \quad \quad x=-3
 \end{array}
 \quad
 \begin{array}{l}
 f(-3) = (-3)^3 + (-3)^2 - 5(-3) + 3 \\
 f(-3) = 0 \quad \text{Therefore } (x+3) \text{ is a factor}
 \end{array}$$

$$\begin{array}{l}
 6) \quad x+1=0 \\
 \quad \quad x=-1
 \end{array}
 \quad
 \begin{array}{l}
 f(-1) = (-1)^3 - 13(-1)^2 + 23(-1) - 11 \\
 f(-1) = -48 \quad \text{Therefore } (x+1) \text{ is } \underline{\text{NOT}} \text{ a factor}
 \end{array}$$

$$\begin{array}{l}
 7) \quad x+16=0 \\
 \quad \quad x = \boxed{-16}
 \end{array}$$

$$\begin{array}{l}
 8) \quad 2x-3=0 \\
 \quad \quad 2x=3 \\
 \quad \quad x = \boxed{\frac{3}{2}}
 \end{array}$$

$$\begin{array}{l}
 9) \quad f(x) = (x-3)(2x-1)(3+x) \\
 \quad \quad x = \boxed{3, \frac{1}{2}, -3}
 \end{array}$$

$$10) \quad f(8)=0 \quad \text{Then } \boxed{(x-8)} \text{ is a factor}$$

$$11) \quad f\left(\frac{3}{2}\right)=0 \quad \text{Then } \left(x-\frac{3}{2}\right) \text{ is a factor or } \boxed{(2x-3)}$$



$$12) f(x) = x^3 + 2x^2 - 8x$$

$$f(x) = x(x^2 + 2x - 8)$$

$$f(x) = \boxed{x(x+4)(x-2)}$$

$$13) p(x) = x^3 - 5x^2 - 4x + 20$$

$$x^2(x-5) - 4(x-5)$$

$$(x^2-4)(x-5)$$

$$\boxed{(x-2)(x+2)(x-5)}$$

$$14) p(x) = x^3 - 2x^2 + 4x - 8$$

$$x^2(x-2) + 4(x-2)$$

$$\boxed{(x^2+4)(x-2)}$$

$$15) p(x) = 2x^5 - 28x^3 - 64x$$

$$= 2x(x^4 - 14x^2 - 32)$$

$$= 2x(x^2-16)(x^2+2)$$

$$= \boxed{2x(x+4)(x-4)(x^2+2)}$$

$$16) -1 \text{ so } x+1 \text{ is a factor}$$

$$\begin{array}{r} 3x^2 + 8x - 3 \\ x+1 \overline{) 3x^3 + 11x^2 + 5x - 3} \\ \underline{-(3x^3 + 3x^2)} \phantom{-3} \\ 8x^2 + 5x \phantom{-3} \\ \underline{-(8x^2 + 8x)} \phantom{-3} \\ -3x - 3 \\ \underline{-(-3x - 3)} \\ 0 \end{array}$$

$$\begin{array}{l} (x+1)(3x^2+8x-3) \\ x=-1 \quad x = \frac{-8 \pm \sqrt{8^2 - 4(3)(-3)}}{2(3)} \\ \phantom{x=-1} \quad \quad \quad x = \frac{-8 \pm \sqrt{100}}{6} \\ \phantom{x=-1} \quad \quad \quad x = \frac{-8 \pm 10}{6} \end{array}$$

$$\boxed{x = -1 \quad x = \frac{1}{3}, -3}$$

$$17) f(x) = (x^2 + 3x + 5)(2x + 3)$$

$$\begin{array}{l} x = \frac{-3 \pm \sqrt{3^2 - 4(1)(5)}}{2(1)} \quad \begin{array}{l} 2x + 3 = 0 \\ -3 - 3 \\ 2x = -3 \\ x = -\frac{3}{2} \end{array} \\ x = \frac{-3 \pm \sqrt{-11}}{2} \end{array}$$

$$\boxed{x = \frac{-3 \pm i\sqrt{11}}{2}, -\frac{3}{2}}$$

$$18) p(x) = 2x^5 - 28x^3 - 64x$$

$$2x(x^4 - 14x^2 - 32)$$

$$2x(x^2-16)(x^2+2)$$

$$2x(x+4)(x-4)(x^2+2)$$

$$\boxed{x = 0, -4, 4, \pm\sqrt{-2}}$$



$$19) \frac{5x+1}{x+3} \geq 3$$

$$\frac{5x+1}{x+3} - \frac{3}{1} \geq 0$$

$$\frac{5x+1}{x+3} - \frac{3(x+3)}{x+3} \geq 0$$

$$\frac{5x+1-3x-9}{x+3} \geq 0$$

$$\frac{2x-8}{x+3} \geq 0$$

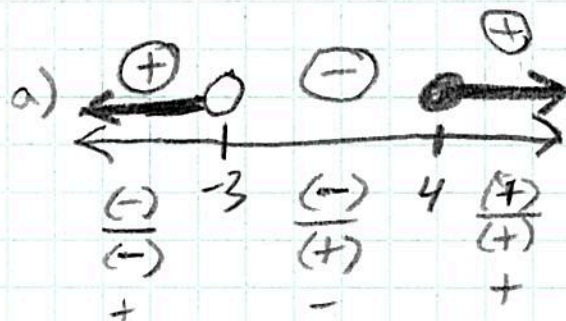
$$2x-8=0$$

$$2x=8$$

$$x=4$$

$$x+3=0$$

$$x=-3$$



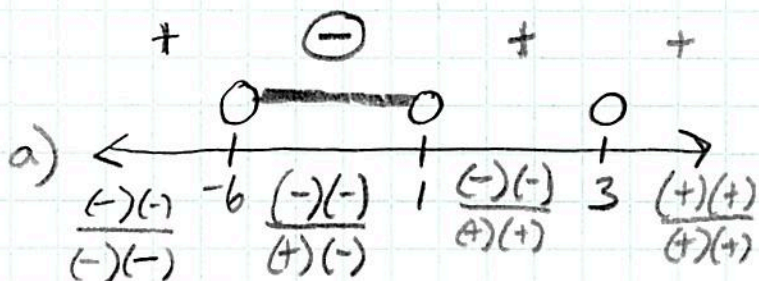
b) SB:  $\{x \mid x < -3 \text{ or } x \geq 4\}$

c) Int:  $(-\infty, -3) \cup [4, \infty)$

$$20) \frac{x^2-6x+9}{x^2+5x-6} < 0$$

$$\frac{(x-3)(x-3)}{(x+6)(x-1)} < 0$$

$$x = 3, -6, 1$$



b) SB:  $\{x \mid -6 < x < 1\}$

c) Int:  $(-6, 1)$

$$21) y = a(x+1)(x+2)(x+3)$$

$$10 = a(2+1)(2+2)(2+3)$$

$$10 = a(3)(4)(5)$$

$$\frac{10}{60} = \frac{a(60)}{60}$$

$$\frac{1}{6} = a$$

$$y = \frac{1}{6}(x+1)(x+2)(x+3)$$

$$22) \textcircled{3}$$

23) Zeros of -2, 4, 10  
Point of (6, 192)

$$y = a(x+2)(x-4)(x-10)$$

$$192 = a(6+2)(6-4)(6-10)$$

$$192 = a(8)(2)(-4)$$

$$192 = -64a$$

$$-3 = a$$

$$\textcircled{2}$$



24) ③

$y = x^3 - 10x^2 + 11x + 70$   
 Look at the table where  $y = 0$  @  $x = 7$   
 therefore  $(x-7)$  is the factor

25) a)  $f(x) = x^3 - 5x^2 - 4x + 20$

$$x^2(x-5) - 4(x-5)$$

$$(x^2 - 4)(x-5)$$

$$(x+2)(x-2)(x-5)$$

$$x = -2 \quad x = 2 \quad x = 5$$

$$\boxed{x\text{-int: } (-2, 0) (2, 0) (5, 0)}$$

b) The graph has 3 x-intercepts but the function "bounces" off at one of them, so that would be a zero with even multiplicity which we know from part (a) is not the case.

double root

26)  $y = a(x+4)^2(x-6)$

$$36 = a(2+4)^2(2-6)$$

$$36 = a(6)^2(-4)$$

$$36 = -144a$$

$$-\frac{1}{4} = a$$

$$\boxed{y = -\frac{1}{4}(x+4)^2(x-6)}$$

27)

$$\frac{5x^2 + 30x}{10x^2} \cdot \frac{x^2 - 4x - 12}{36 - x^2} = \frac{\cancel{5x}(x+6)}{\cancel{10x^2}^{2x}} \cdot \frac{\overset{-1}{(x-6)}(x+2)}{(6-\cancel{x})(6+x)} = \boxed{\frac{-(x+2)}{2x}}$$



28)

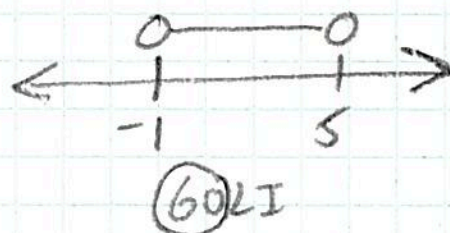
$$\begin{array}{r}
 4x^2 + 18x + 98 + \frac{500}{x-5} \\
 x-5 \overline{) 4x^3 - 2x^2 + 8x + 10} \\
 \underline{-(4x^3 - 20x^2)} \\
 18x^2 + 8x \\
 \underline{-(18x^2 - 80x)} \\
 98x + 10 \\
 \underline{-(98x - 490)} \\
 500
 \end{array}$$

$$a) P(x) = 4x^2 + 18x + 98$$

b) No, because there is a remainder.

29)

$$\begin{aligned}
 x^2 - 4x - 5 &< 0 \\
 (x-5)(x+1) \\
 x=5 \quad x=-1
 \end{aligned}$$



$$\begin{aligned}
 \text{SB: } \{x \mid -1 < x < 5\} \\
 \text{Int: } (-1, 5)
 \end{aligned}$$

30)

$$\begin{aligned}
 x^2 + 6x &= -11 \\
 x^2 + 6x + 11 &= 0
 \end{aligned}$$

$$a=1$$

$$b=6$$

$$c=11$$

$$\begin{aligned}
 b^2 - 4ac \\
 6^2 - 4(1)(11) \\
 36 - 44 \\
 -8 \quad (d)
 \end{aligned}$$

31)

$$ax^2 + 4x = -2$$

$$ax^2 + 4x + 2 = 0$$

$$b^2 - 4ac = 0$$

$$4^2 - 4a(2) = 0$$

$$16 - 8a = 0$$

$$16 = 8a$$

$$2 = a$$

$$b^2 - 4ac = 0$$

real/eq val

$$a=2$$

32)

$$\sqrt{7x-3} + 3 = 2x$$

$$(\sqrt{7x-3})^2 = (2x-3)^2$$

$$\begin{array}{r}
 7x-3 = 4x^2 - 12x + 9 \\
 \underline{-7x+3 \quad -7x+3} \\
 0 = 4x^2 - 19x + 12
 \end{array}$$

$$0 = 4x^2 - 19x + 12$$

$$4x^2 - 16x - 3x + 12$$

$$4x(x-4) - 3(x-4)$$

$$\begin{aligned}
 (4x-3)(x-4) \\
 4x-3=0 \quad (x-4) \\
 4x=3 \quad x=4 \\
 x=\frac{3}{4} \\
 \text{reject}
 \end{aligned}$$



33)

$$\frac{\text{LCD}}{ab} \quad \frac{(ab)\frac{a}{b} - \frac{b}{a}(ab)}{(ab)\frac{1}{a} + \frac{1}{b}(ab)} = \frac{a^2 - b^2}{b+a} = \frac{(a+b)(a-b)}{b+a} = \boxed{a-b}$$

$a \neq 0$   
 $b \neq 0$   
 $a \neq -b$

34)

$$\frac{7(x(x+1))}{x} - 4 = \frac{x(x+1) - 4x}{x+1}$$

$\frac{\text{LCD}}{x(x+1)}$

$$7(x+1) - 4x(x+1) = -4x(x)$$

$$7x+7 - 4x^2 - 4x = -4x^2$$

$$\begin{array}{r} 3x+7 - 4x^2 = -4x^2 \\ +4x^2 \quad +4x^2 \\ \hline \end{array}$$

$$3x+7 = 0$$

$$3x = -7$$

$$\boxed{x = -\frac{7}{3}}$$

35)

$$2\sqrt{-50} - 3\sqrt{-8}$$

$$2i\sqrt{50} - 3i\sqrt{8}$$

$$2i\sqrt{25}\sqrt{2} - 3i\sqrt{4}\sqrt{2}$$

$$2i(5)\sqrt{2} - 3i(2)\sqrt{2}$$

$$10i\sqrt{2} - 6i\sqrt{2} = \boxed{4i\sqrt{2}}$$